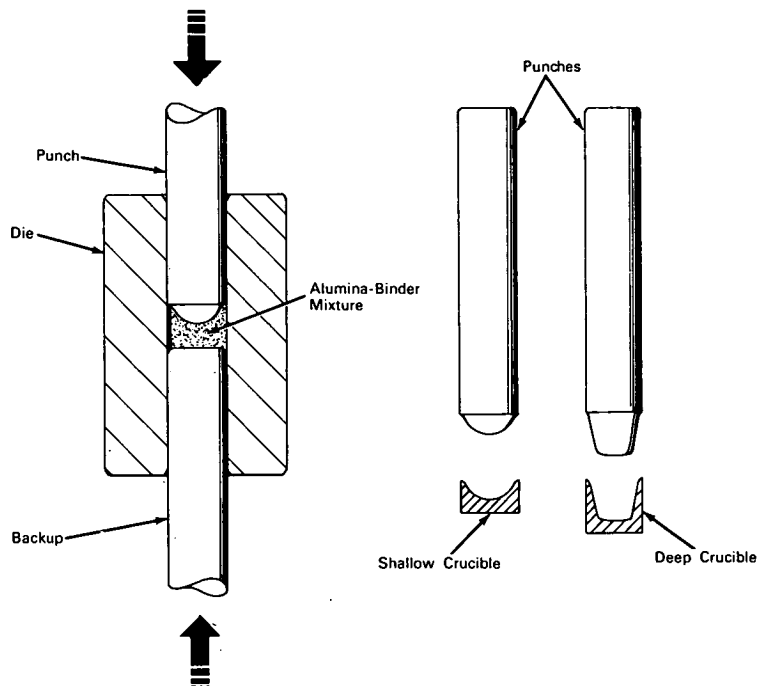


NASA TECH BRIEF



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Fabrication Method Produces High-Grade Alumina Crucibles



The problem: Fabricating small alumina crucibles suitable for use in solid-state diffusion experiments on inorganic crystals, such as sapphire.

The solution: A fabrication process employing a hardened steel die having a bore of constant internal diameter in conjunction with a set of mating punches which are used to dry-press a mixture of alumina powder and binder to form crucibles of various internal configurations before firing.

How it's done: Alumina powder of high purity is mixed in a jar mill with acetone and a binder consisting of methyl methacrylate. The mixture is then dry-pressed in a die using a mating punch to form a cavity of the desired shape in the alumina-binder mixture. The crucible is removed from the die and pre-fired at 1,250°C to burn out the organic constituents and develop a weak ceramic bond. After pre-firing, the crucible is matured at 1,650° to 1,750°C in a zirconia-lined oxyacetylene furnace to yield a dense,

(continued overleaf)

fine-grained ceramic structure suitable for use in diffusion experiments.

Notes:

1. A single hardened steel die and a set of punches similar to those illustrated could also be used with various other ceramic materials.

2. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer
Marshall Space Flight Center
Huntsville, Alabama, 35812
Reference: B65-10078

Patent status: NASA encourages commercial use of this innovation. No patent action is contemplated.

Source: Hayne Palmour
(M-FS-216)